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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WEST, JEFFREY R	
ART UNIT	**PAPER NUMBER**
2857	

DATE MAILED: 12/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/667,297	LOVEGREN ET AL.
	Examiner	Art Unit
	Jeffrey R. West	2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 16 is objected to because of the following informalities:

In claim 16, line 5, to avoid problems of antecedent basis, "the estimated first pulse" should be ---the first pulse---.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,457,990 to Oswald et al. in view of U.S. Patent No. 5,969,666 to Burger et al.

Oswald discloses a method for use by a level transmitter to detect a reflection of a transmitted pulse from a first material interface, the method comprising calculating an estimated first reflected pulse amplitude as a function of a reference amplitude of the transmitted pulse (column 9, lines 31-53 and column 10, lines 49-53) and detecting the reflected pulse from the first material interface using the estimated first reflected pulse amplitude by setting/calculating a first threshold value as a function

of the estimated first reflected pulse amplitude (column 10, lines 53-58) using a transceiver apparatus for transmitting a pulse having a transmit amplitude and receiving the pulses to produce a signal representing the reflected wave pulses as part of a controlling processor system (column 7, lines 16-30 and Figures 5, 9, and 10).

Oswald discloses a level calculation module executable by the processor system that establishes a level of the first material interface using the signal and the threshold value (column 4, lines 43-56 and column 8, lines 57-47) and outputs this level through a port to a display means (column 7, lines 28-30).

Oswald discloses detecting multiple pulses (column 6, lines 54-58) wherein a first reflected pulse corresponds to the portion of a transmitted pulse reflected at a first material interface between air and a first product (i.e. first and second materials), a second reflected pulse corresponding to the portion of a transmitted pulse reflected at a first material interface between the first product and a second product (i.e. second and third materials), and a fiducial pulse corresponding to the portion of a transmitted pulse reflected at the fiducial interface at the top of the tank (column 4, lines 12-16 and column 7, lines 7-9).

While Oswald generally discloses generating a transmission pulse, Oswald does not specify that the pulse be a microwave pulse.

Burger teaches a radar-based method of measuring the level of a material in a containing comprising a transmitter antenna that generates microwave pulses (column 2, lines 3-23).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald to include specifying that the pulse be a microwave pulse, as taught by Burger, because Oswald suggests determining the location of a discontinuity based upon time calculations (column 2, lines 5-12 and column 8, lines 37-40) and Burger suggests that microwave pulses would be advantageous in allowing the determination of the pulse propagation time thereby allowing easier time calculations (column 3, lines 19-31).

Further since Oswald teaches a fiducial interface formed between source and the first material and Burger teaches using an antenna as the source, the combination teaches a fiducial interface formed between the antenna and the first material.

4. Claims 10, 11, 16, 17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oswald et al. in view of Burger et al. and further in view of U.S. Patent No. 3,812,422 to De Carolis.

As noted above, the invention of Oswald and Burger teaches many of the features of the claimed invention including determining a detection threshold as a predetermined fraction of the amplitude of the reflection (column 1, line 63 to column 2, line 4) but does not specifically teach incorporating the dielectric parameters of the materials in calculating the reflected pulse amplitude.

De Carolis teaches an apparatus for measuring the levels of fluids and the dielectric constants of the same comprising setting a first dielectric parameter corresponding to a dielectric of a first material (i.e. air) adjacent to a source (column

1, lines 13-14), setting, using a dielectric constant calculator, a second dielectric parameter to a value corresponding to a dielectric of a second material located below the first material, and calculating the amplitude of the reflected pulse as a function of a distance determined from the first and second dielectric parameters as well as a velocity of the pulse (column 1, line 66 to column 2, line 27 and column 3, lines 58-64).

De Carolis further teaches that the dielectric constant calculator calculates the dielectric parameter relating to one of the properties of the material (e) as a function of ρ (column 2, lines 5-8), wherein p is the ratio between the magnitude of the reflected signal and the incident signal magnitude (i.e. ρ is a function of the transmit pulse amplitude and the reflective amplitude) (column 1, lines 27-34).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald and Burger to include incorporating the dielectric parameters of the materials in calculating the reflected pulse amplitude, as taught by De Carolis, because the combination would have provided improved calculation by taking into account various parameters that directly affect the pulse propagation and further because De Carolis suggests that the combination would have provided accurate results by correcting the reflection pulse according to the material dielectric values in instances wherein more than only the top level of the liquid is to be measured, as is the case with Oswald and Burger (column 5, lines 8-37).

Further, with respect to claims 16 and 20, since the invention of Oswald and Burger teaches calculating a threshold as a function of an estimated first pulse

amplitude and De Carolis teaches using the dielectric parameters of the materials involved to provide accurate pulse calculations, the combination would have provided a method for using the dielectric parameters when calculating the estimated first pulse amplitude to insure accurate results. Although this combination does not specifically provide first calculating an estimated first pulse amplitude without taking into account a correctly calculated dielectric parameter and subsequently "re-calculating" the estimated first pulse amplitude after a correctly calculated dielectric parameter is obtained, these two methods are considered to be functionally equivalent because both methods arrive at the same result of an estimated pulse calculated as a function the correct dielectric parameters.

5. Claims 2, 4-9, 12, 13, 18, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oswald in view Burger and De Carolis and further in view of U.S. Patent No. 5,609,059 to McEwan.

As noted above, Oswald in combination with Burger and De Carolis teaches many of the features of the claimed invention but does not specifically teach incorporating an offset correction factor in calculating the first reflected pulse amplitude of a microwave pulse and only specifically describes calculating an estimated first reflected pulse amplitude as a function of a reference amplitude of the transmitted pulse and detecting the reflected pulse from the first material interface using the estimated first reflected pulse amplitude by setting a first threshold value

as a function of the estimated first reflected pulse amplitude, and not specifically for the second and third pulses/interfaces.

McEwan teaches an electronic multi-purpose material level sensor that determines the level of a product by measuring the time delay between transmitted and received reflected microwave pulses (column 6, lines 22-28) wherein the magnitude of the reflected pulse is calculated as a function of the dielectric constant of the first material and the dielectric of the second material (column 6, lines 29-34), and all the reflected pulse measurements are corrected by taking the measurements between the fiducial pulse and the reflection pulse relative to the antenna, or launcher plate, rather than to the transceiver (i.e. offsetting the pulse measurements) (column 6, lines 49-53).

McEwan also teaches determining the level of multiple substances (column 7, lines 62-65) wherein a pulse is detected for each interface using a corresponding threshold for each pulse (i.e. fiducial and surface/interface levels) (column 8, line 66 to column 9, line 4).

McEwan also teaches that the fiducial interface is formed between the antenna and the first material (column 6, lines 43-49).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald, Burger, and De Carolis to include incorporating an offset correction factor in calculating the pulse amplitudes, as taught by McEwan, because, as suggested by McEwan, the combination would have reduced or eliminated errors and drift introduced by the cable (column 6, lines 49-53).

Further, while Oswald in combination with Burger and De Carolis only specifically describes calculating an estimated first reflected pulse amplitude as a function of a reference amplitude of the transmitted pulse and detecting the reflected pulse from the first material interface using the estimated first reflected pulse amplitude by setting a first threshold value as a function of the estimated first reflected pulse amplitude and first and second dielectrics, and not specifically for the second and third pulses/interfaces using a third dielectric, McEwan does suggest using a corresponding threshold for each pulse (i.e. fiducial and surface/interface levels) (column 8, line 66 to column 9, line 4) and it would have been obvious to one having ordinary skill in the art to perform corresponding steps to obtain a plurality of thresholds because the combination would have provided a method for accurately detecting the occurrence of each pulse rather than only the first pulse occurring at the first interface.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oswald in view of Burger and further in view of U.S. Patent No. 5,609,059 to McEwan.

As noted above, the invention of Oswald and Burger teaches many of the features but does not specifically teach incorporating an offset correction factor in calculating the estimated first reflected pulse amplitude.

McEwan teaches an electronic multi-purpose material level sensor that determines the level of a product by measuring the time delay between transmitted

and received reflected microwave pulses (column 6, lines 22-28) wherein the magnitude of the reflected pulse is calculated as a function of the dielectric constant of the first material and the dielectric of the second material (column 6, lines 29-34), and all the reflected pulse measurements are corrected by taking the measurements between the fiducial pulse and the reflection pulse relative to the antenna, or launcher plate, rather than to the transceiver (i.e. offsetting the pulse measurements) (column 6, lines 49-53).

McEwan also teaches determining the level of multiple substances (column 7, lines 62-65) wherein a pulse is detected for each interface using a corresponding threshold for each pulse (i.e. fiducial and surface/interface levels) (column 8, line 66 to column 9, line 4).

McEwan also teaches that the fiducial interface is formed between the antenna and the first material (column 6, lines 43-49).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald and Burger to include incorporating an offset correction factor in calculating the pulse amplitudes, as taught by McEwan, because, as suggested by McEwan, the combination would have reduced or eliminated errors and drift introduced by the cable (column 6, lines 49-53).

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oswald in view of Burger and De Carolis and further in view of U.S. Patent No. 5,500,649 to Mowrey et al.

As noted above, Oswald in combination with Burger and De Carolis teaches all of the features of the claimed invention except for setting a threshold value as a function of an offset value.

Mowrey teaches a method and apparatus for monitoring the thickness of a coal rib comprising a transmitter that transmits radio waves toward the coal rib, a receiving means that receives a portion of the reflected energy from the air-coal interface, and a processor means that determines the thickness of the coal rib by calculating the difference between the transmitting and reflecting times (column 2, line 60 to column 3, line 19). Mowrey further teaches adjusting the radar signal, by an offset value, to change the wave-detecting threshold value to an acceptable level (column 7, line 65 to column 8, line 10).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald, Burger, and De Carolis to include setting a threshold value as a function of an offset value, as taught by Mowrey, because as suggested by Mowrey, the combination would have provided a method of obtaining accurate results by calibrating the transmitter and receiver based on the current operating conditions (column 8, lines 6-10).

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oswald in view of Burger, De Carolis, and McEwan and further in view of U.S. Patent No. 5,500,649 to Mowrey et al.

As noted above, Oswald in combination with Burger, De Carolis, and McEwan teaches many of the features of the claimed invention including preventing attenuation error in the reflected pulse measurement (McEwan, column 5, lines 15-21) and insuring that the threshold value remains at a valid level by applying a range factor (McEwan, column 4, lines 35-50) but does not teach setting a threshold value as a function of an offset value.

Mowrey teaches a method and apparatus for monitoring the thickness of a coal rib comprising a transmitter that transmits radio waves toward the coal rib, a receiving means that receives a portion of the reflected energy from the air-coal interface, and a processor means that determines the thickness of the coal rib by calculating the difference between the transmitting and reflecting times (column 2, line 60 to column 3, line 19). Mowrey further teaches adjusting the radar signal, by an offset value, to change the wave-detecting threshold value to an acceptable level (column 7, line 65 to column 8, line 10).

It would have been obvious to one having ordinary skill in the art to modify the invention of Oswald, Burger, De Carolis, and McEwan to include setting a threshold value as a function of an offset value, as taught by Mowrey, because as suggested by Mowrey, the combination would have provided a method of obtaining accurate results by calibrating the transmitter and receiver based on the current operating conditions (column 8, lines 6-10).

Response to Arguments

9. Applicant's arguments filed September 27, 2004, have been fully considered but they are not persuasive.

Applicant first argues the Examiner's assertion that Oswald teaches calculating an estimated first reflected pulse amplitude as a function of a reference amplitude of the transmitted microwave pulse and instead indicates that "Oswald et al. merely discloses the ability to set various threshold values rather than how such threshold values are calculated."

The Examiner first asserts that the specification summarizes the invention as "[a] method and apparatus for setting threshold values for use by a radar level transmitter to detect reflected wave pulses corresponding to portions of a transmitted microwave pulse which reflect from interfaces contained in a container. The present invention estimates these threshold values based on various parameters . . .". From this disclosure it can be seen that the estimated first reflect pulse amplitude corresponds to the threshold values.

Turning now to the disclosure of Oswald, a transmitted reference pulse is first received (column 10, lines24-36), a reference amplitude is then detected (i.e. "The positive 90 and negative 92 peak voltage trackers hold the maximum and minimum values of the waveform using capacitors c48 and c49 respectively. The differentiator 131 and comparator 132 detect the instant of the zero slope or the peak", column 10, lines 49-53) and, as a function of the reference amplitude, an estimated first reflected pulse amplitude/threshold is calculated (i.e. "The outputs of the voltage trackers 90 and 92 respectively define positive and negative threshold levels, each

being a predetermined fraction of the respective peak value", column 10, lines 53-56).

The Examiner asserts that the threshold values corresponding to the claimed "estimated first reflection pulse amplitude" are not simply set as the values held in the capacitors c48 and c49, but instead are calculated as a "predetermined fraction of the respective peak value". Therefore, the invention of Oswald does disclose the method for calculating the thresholds and meets the corresponding limitation of claim 1.

Applicant also "disagrees with the Examiner's conclusion that a motivation to combine the cited references exits based upon on a finding that 'Burger suggests that the microwave pulses would be advantageous in allowing the determination of the pulse propagation time thereby allowing easier time calculations (column 3, lines 19-31).' In particular, the cited disclosure of Burger et al. fails to make any comparison between the use of a submerged transmission line and the use of a microwave pulse to locate material interfaces, or provide a basis for a finding that one would be 'easier' than the other. Additionally, not only do the cited references fail to suggest the interchangeability between the submerged transmission line method of Oswald et al. and the microwave pulse method of Burger et al., neither reference makes any mention of the method used by the other. Applicant submits that such a suggestion or motivation must be provided in order to combine the references."

First, the Examiner asserts that the motivation to combine the inventions of Oswald and Burger arises from the fact that Oswald discloses that "[t]he required information may be an indication of the position along the transmission line of the discontinuity, in which case the analysis for the reflected signal comprises determining a reception time at which a given point on the reflected signal is received, said indication being obtained from a calculating of the time delay between a start time when the transmitted signal is applied to the transmission line, and said reception time" (column 2, lines 5-12) and "the interface means 44 receives and converts the sampled signal to a level meter signal indicating the level of fuel in the tank 12 by sensing the difference in time between impedance change points" (column 8, lines 37-40). Therefore Oswald suggests determining the location of a discontinuity based upon time calculations.

Burger then teaches that microwaves have well-defined and known propagation velocities (column 3, lines 19-31) and therefore suggests that microwave pulses would be advantageous in allowing the determination of the pulse propagation time thereby allowing easier time calculations (column 3, lines 19-31).

The Office Action indicated that the proposed combination was to modify the invention of Oswald to include specifying that the pulse be a microwave pulse rather than replacing the use of a submerged transmission line with the use of a microwave pulse through air.

Applicant then argues that, with respect to the rejection of claims 10, 11, 16, 17 and 19-21 under 35 U.S.C. 103(a) as being unpatentable over Oswald et al. in view of Burger et al. and further in view of De Carolis, "Oswald et al. only discloses the setting of a threshold value, but fails to disclose any manner in which that threshold value is calculated. Accordingly, Oswald et al. and its combination with Burger et al. fail to disclose or suggest any calculation of an 'estimated first reflected first pulse amplitude', 'a first pulse amplitude', or a 'first threshold value', as described in independent claims 1, 10 and 17, respectively. Accordingly, even when one assumes that the Examiner's position is correct regarding the teachings of De Carolis, its combination with Oswald et al. and Burger et al. still fails to render independent claims 10 and 17 obvious. Additionally, Applicant submits that there is no motivation to combine the references for the reasons set forth above."

As noted above, the invention of Oswald and Burger does disclose calculating the threshold values and proper motivation exists to make the combination.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

U.S. Patent No. 6,622,370 to Sherman et al. teaches a method for fabricating suspended transmission lines including transmission lines that propagate microwave and radio frequency energy between components of a circuit.

U.S. Patent No. 6,545,646 to Marchand teaches an integrated dipole detector for microwave imaging including a transmission line that propagates microwave energy to a transmitting element.

U.S. Patent No. 6,529,085 to Hajimiri et al teaches a tunable, distributed, voltage-controlled oscillator including means for introducing a controllable time delay to the microwave signal propagating on the transmission lines of a VCO.

U.S. Patent No. 6,437,669 to Welstand et al. teaches a microwave to millimeter wave frequency substrate interface including a teaching that it is known to efficiently propagate microwave and millimeter wave frequencies through coaxial cables or waveguides.

U.S. Patent No. 6,111,547 to Gau et al. teaches a modularized multiple-feed electromagnetic signal receiving apparatus including means for microwave signals to be converted to an intermediate frequency suitable for propagation in transmission cables.

U.S. Patent No. 5,600,248 to Westrom teaches a fault distance locator for underground cable circuits including determining a time interval between the beginning of the pulse injection and the subsequent peak/pulse (i.e. point of correlation) indicative of a line abnormality and then multiplying the time interval times the propagation speed to determine the distance to the location of the fault (column 9, lines 56-64).

U.S. Patent No. 4,597,183 to Broding teaches methods and apparatus for measuring a length of a cable suspending a well logging tool in a borehole by calculating the length of the round trip of the signal through the cable by multiplying a time interval between the generation of the sequence and a signal component indicating the reflection by the velocity of propagation.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday thru Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
November 30, 2004

Marc Hoff
MARC S. HOFF
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